Appendix C
Seawalls

C-1. Curved Face

a. General. A curved-face seawall is designed to accommodate the impact and runup of large waves while directing the flow away from the land being protected. As the flow strikes the wall, it is forced to flow along the curving face and ultimately is released in a vertical trajectory, falling harmlessly back to the ground, or it is recurved to splash back seaward, the tremendous wave forces that must be resisted and redirected require a massive structure with an adequate foundation. Wave reflections from the wall also demand sturdy toe protection.

b. Prototype installation. A classic example is the Galveston seawall (Figure C-1) built in response to the devastating hurricane that struck that area in 1900. A large concrete structure with a compound-radius face, it is founded on piles and fronted with heavy stone toe protection. The vertical height is about 16 ft, measured from the base of the concrete pile caps. In addition, a sheetpile cutoff wall provides a last line of defense against toe scour that would threaten to undermine the wall.

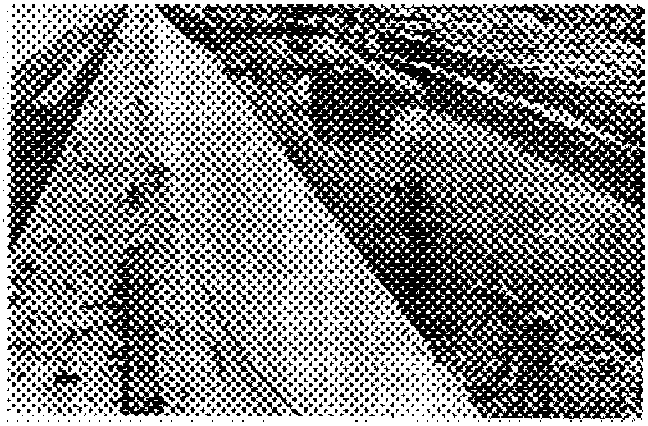

Figure C-1. Curved-face seawall, Galveston, TX

c. Cross section of curved-face seawall. A cross section of the Galveston seawall, fairly typical of this type of construction, is shown in Figure C-2.

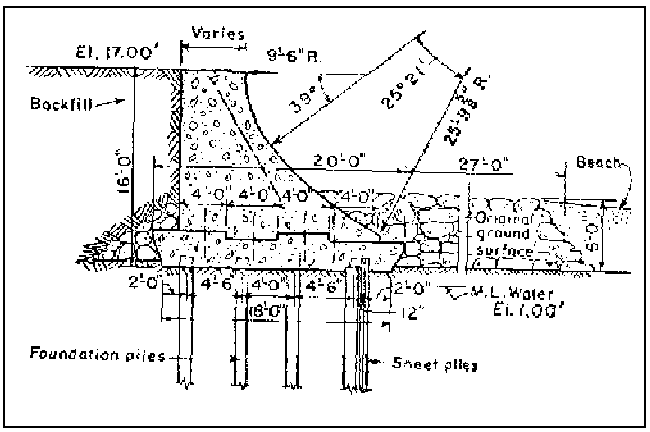

Figure C-2. Curved-face seawall cross section

C-2. Stepped Face

a. General. These seawalls are designed to limit wave runup and overtopping by the hindering action of the stepped face on the advancing wave front. Although somewhat less massive than curved-face seawalls, the general design requirements for structural stability are the same for this kind of structure.

b. Prototype installation (Figure C-3). The best example is probably the Harrison County, MS, seawall (Escoffier and Dolive 1954). The total wall height is 8 ft, consisting of eight 12-in.-high steps. The horizontal width of the structure is 13.5 ft with nine 18-in.-wide treads. The structure is founded on wood piles, and sheetpiling is used as a cutoff wall to prevent undermining. No stone toe protection is employed.

c. Cross section of prototype stepped-face wall. Figure C-4 shows the features of the Harrison County seawall, which is typical of this type of construction.

C-3. Combination Stepped and Curved Face

a. General. This kind of structure combines a massive curved face with a fronting stepped section that incorporates the advantages of both of those kinds of seawalls.

b. Prototype installation. The best example is the seawall near Ocean Beach in San Francisco, CA (Figure C-5). It represents what is perhaps the most massive

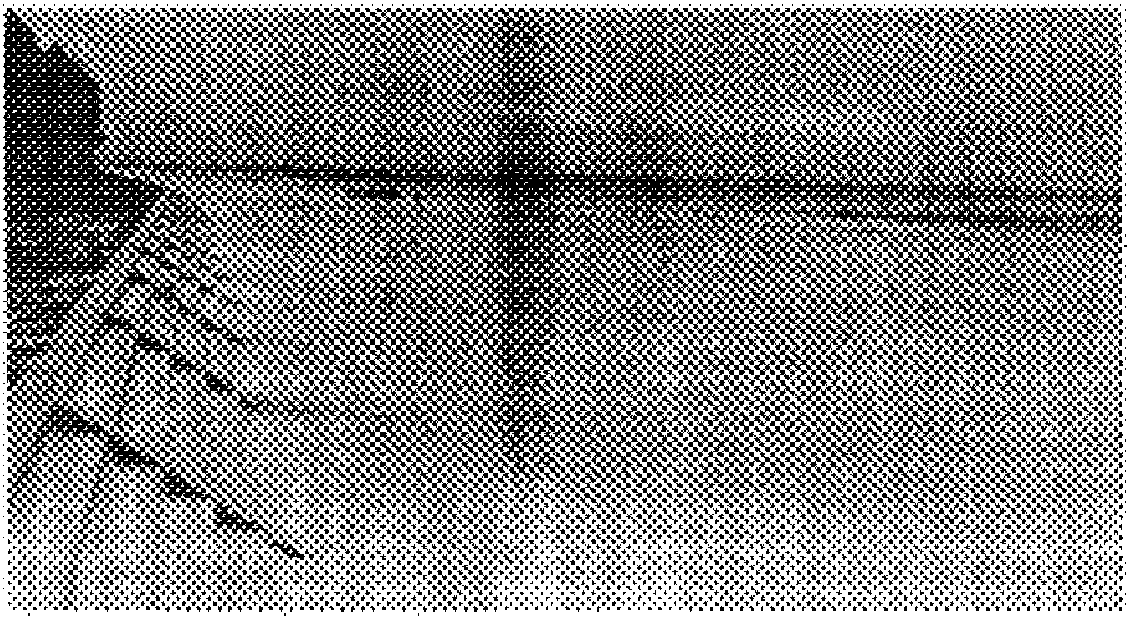

Figure C-3. Stepped-face seawall, Harrison County, MS

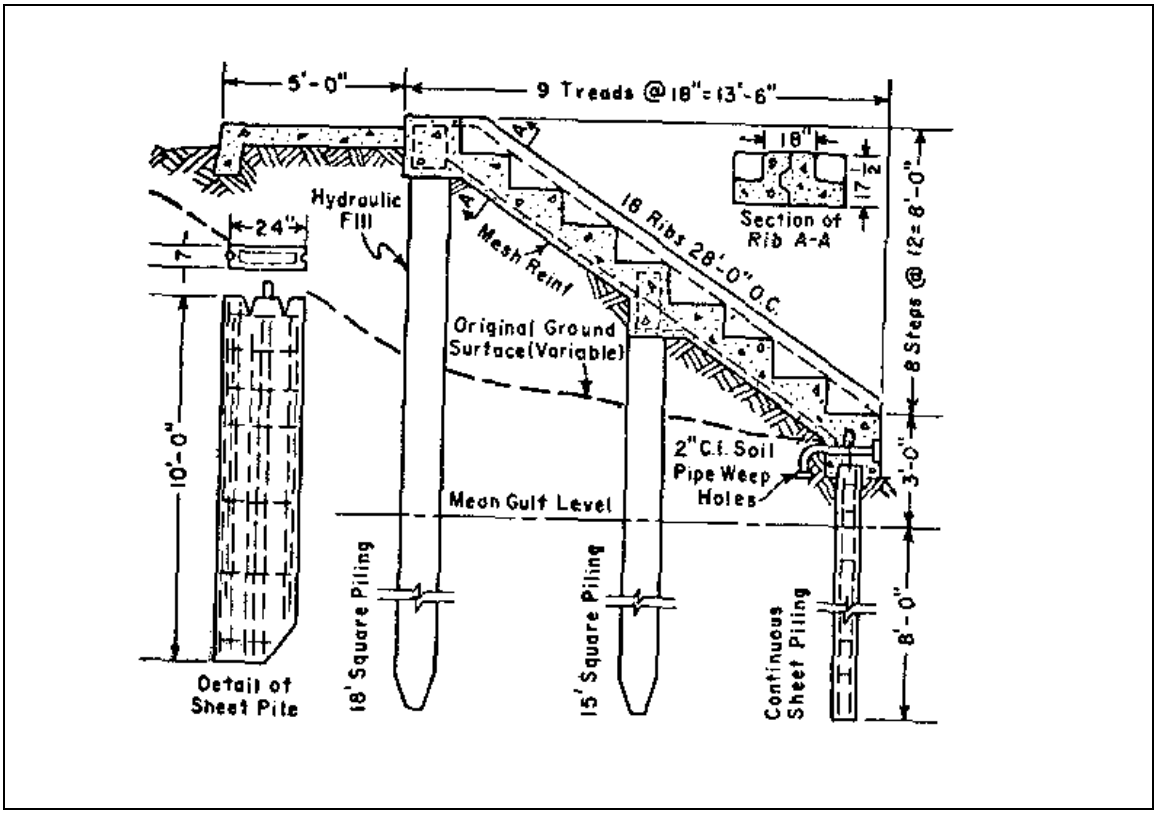

Figure C-4. Stepped-face seawall cross section

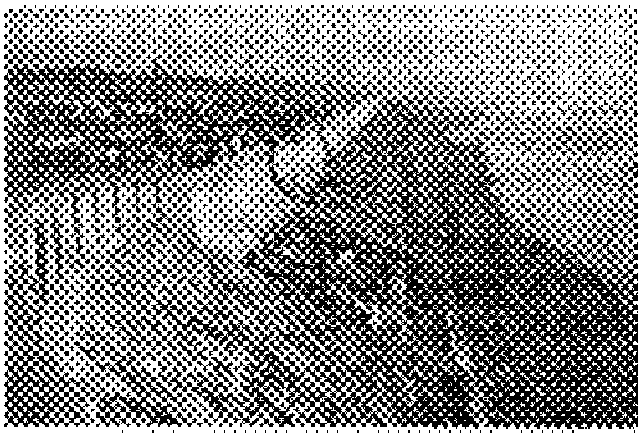

Figure C-5. Combination stepped- and curved-face seawall, San Francisco, CA

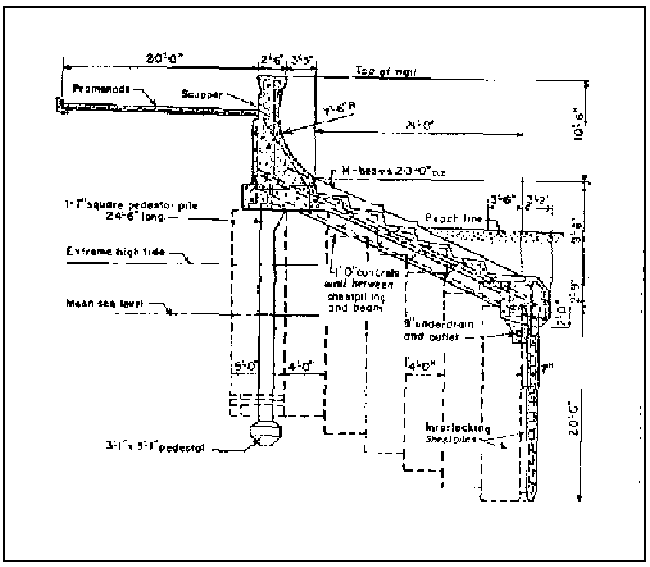

Figure C-6. Combination stepped- and curved-face seawall cross section

coastal structure ever built in this country. The initial stepped section rises about 10 ft to its junction with a short-radius curved face that continues vertically for an additional 10.5 ft. The wall is founded on piles, and interlocking sheetpiling provides an effective cutoff wall at the toe. In addition, the lower section of the stepped face is deeply buried below the original beach face to minimize the risk that toe scour would ever approach the cutoff wall.

c. Cross section of combination wall.

Figure C-6 shows the features of the San Francisco seawall, which is typical of this type of construction.

C-4. Rubble

a. General. A rubble seawall is essentially a rubble breakwater that is placed directly on the beach. The rock is sized in accordance with standard selection methods for stability, and the structure acts to absorb and limit wave advance up the beach. The rough surface of such structures tends to absorb and dissipate wave energy with a minimum of wave reflection and scour.

b. Prototype installation. A typical structure at Fernandina Beach, FL, is shown in Figure C-7. The structure has a core of graded, small stones and an armor layer of large cap stones. In lieu of the rubble back slope, a concrete parapet wall could be substituted to provide a more positive barrier to the flow of water up the beach.

c. Cross section of a rubble-mound seawall. Figure C-8 shows the features of the Fernandina Beach seawall, which is typical of this type of construction.

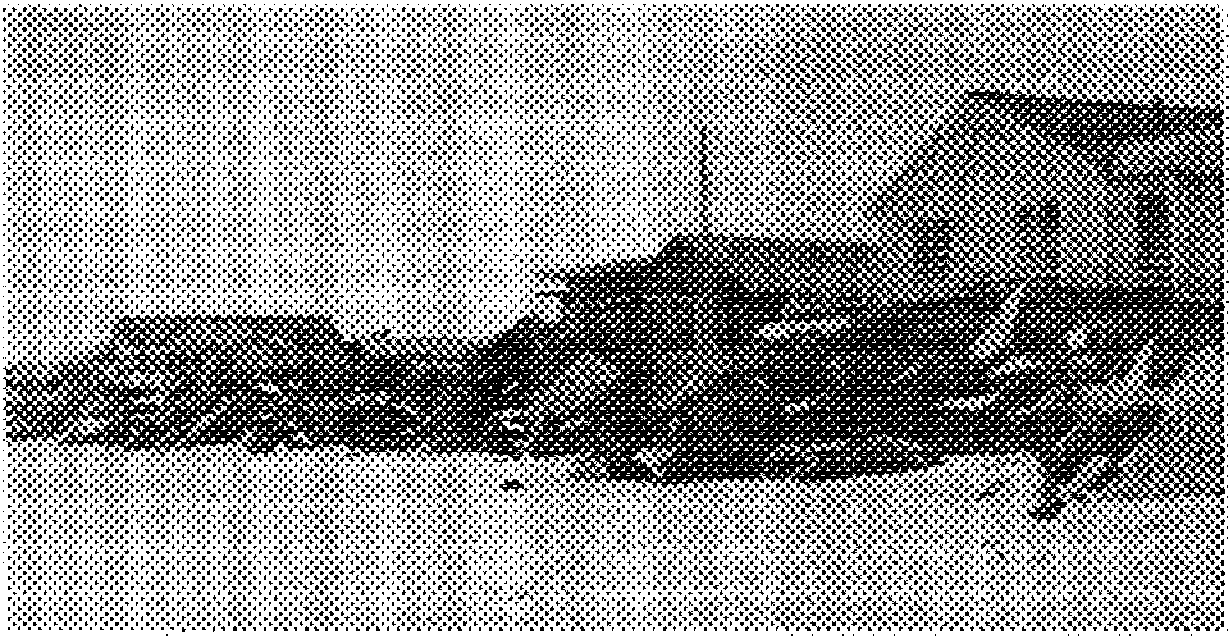

Figure C-7. Rubble-mound seawall, Fernandina Beach, FL

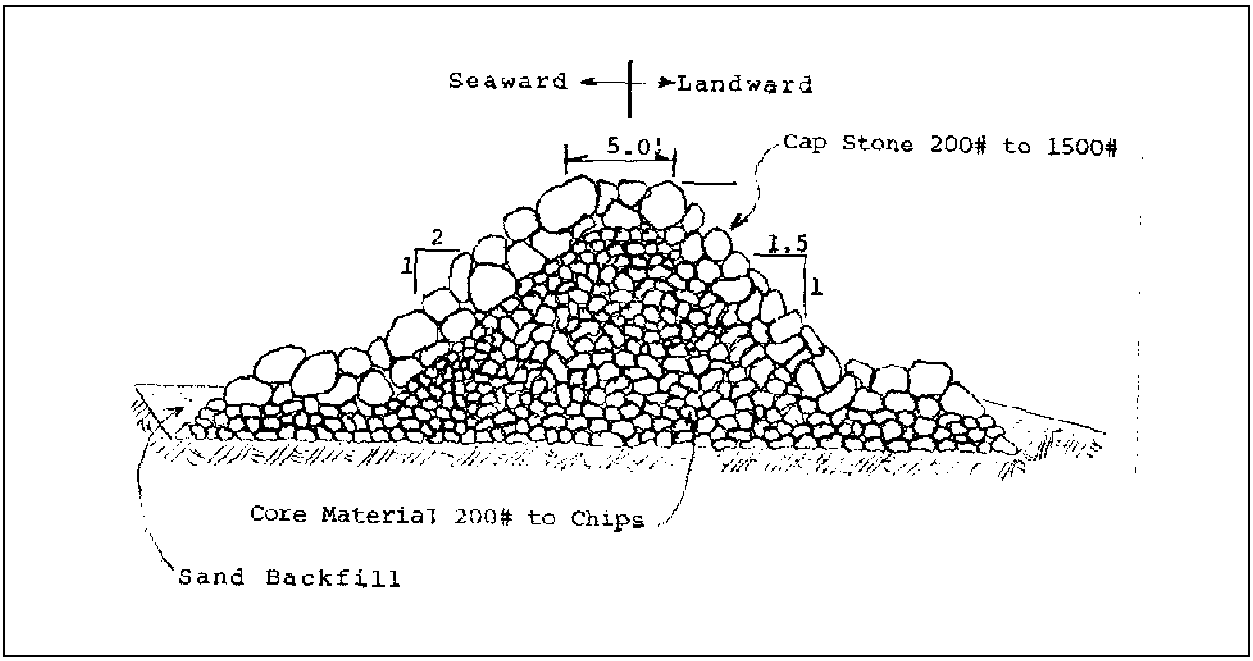

Figure C-8. Rubble-mound seawall cross section